AD-A170 528 AIR FORCE INTEGRATED READINESS MEASUREMENT SYSTEM DATA AUTOMATION REQUIREMENT (FINAL)(U) SOFTECH INC ALEXANDIRIA VA 14 MAR 80 1031-2-6 MDA903-76-C-0396 1/1

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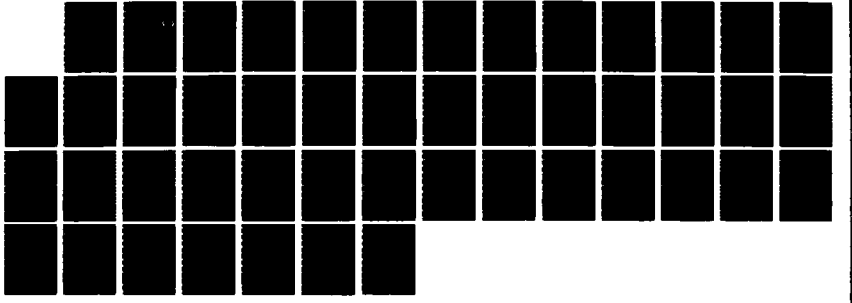

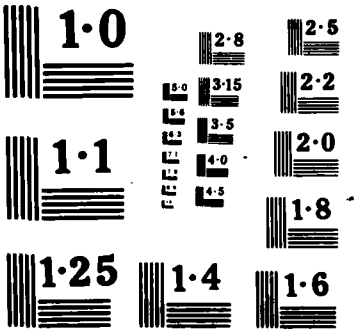
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AIR FORCE INTEGRATED

READINESS MEASUREMENT SYSTEM

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AD-A170 528

DATA AUTOMATION REQUIREMENT

(FINAL)

Prepared for
UNITED STATES AIR FORCE
READINESS MEASUREMENT GROUP
(AF/XOORM)

Under
Contract MDA-903-76-C-0396
Report 1031-2-6
by SofTech, Inc.

14 March 1980

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ABSTRACT

This Basic AFIRMS DAR requests ADP resources for continued development of AFIRMS. It deals in greatest detail with the AFIRMS Learning Prototype Phase. Future development phases are outlined to facilitate updating and resubmitting the Final DAR after the Learning Prototype Phase has clarified alternatives.

The Feasibility Study discusses the progress of AFIRMS as detailed in the AFIRMS Functional Area Requirement (FAR) and recommends an eight-step, iterative, Learning Prototype Phase for determining implementation alternatives. The AFIRMS Learning Prototype Phase Economic Analysis is included as attachment 4 and spans 1980 to 1982. The Basic Operational AFIRMS Economic Analysis is included as Attachment 1 and spans 1984 - 1989.

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DATA AUTOMATION REQUIREMENT (DAR)
JUSTIFICATION FOR DEVELOPMENT OF THE AIR FORCE INTEGRATED
READINESS MEASUREMENT SYSTEM (AFIRMS).

1. Purpose

a. This DAR requests ADP resources for continued development of AFIRMS. The requirements to be satisfied are fully documented in the AFIRMS Functional Area Requirement (FAR) prepared for AF/XOORM under contract MDA-903-76-C-0396, as report 1031-2-5, 14 March 1980 (Final).

b. This is the basic DAR for the AFIRMS. It deals in greatest detail with the next (learning prototype) phase of the program and in lesser detail with future phases. A description of the AFIRMS Learning Prototype Phase is in attachment 2, Feasibility Study, paragraph 4. Following the Learning Prototype Phase is the Operational Phase, which includes development and employment of the operational AFIRMS. Specific concern is with a requirement for ADPS for an AFIRMS Learning Prototype Phase. Future development phases are outlined to facilitate updating and submitting amendments for the final DAR after the Learning Prototype Phase has clarified alternatives.

c. This DAR does not detail the acquisition of ADPE. Since it is anticipated that the Learning Prototype Phase will require ADPE support, an estimated ADPE cost is supplied. But it is requested that the authority to acquire specific items be given to the Contractor with the Air Force reserving the right to supply them through its own channels. The acquisition of ADPE for the operational AFIRMS will be addressed in the final DAR based on the results of the Learning Prototype Phase. Anticipated ADP resources will be provided under future contracts.

2. Objectives

a. The overall objective of the AFIRMS program is to support Air Force decision makers and their staffs by obtaining and making available a complete, timely, and accurate measurement of readiness.

b. The specific objective of AFIRMS' Learning Prototype Phase is to provide supporting information for the decision of what capability will be provided in the AFIRMS' Operational Phase and how the operational capability will be implemented. The learning

prototype will determine the feasibilty of the FAR requirements, validate the readiness concept, measure the reliability of hypothetical operational system alternatives, and reduce uncertainty in the cost factors of the operational system.

3. Background

a. The AFIRMS program was initiated by the Directorate of Operations and Readiness, Headquarters United States Air Force in April 1978. Study and analysis of readiness measurement requirements of the Air Force proceeded and several working documents (A User's View of AFIRMS, AFIRMS Data Analysis, and Initial AFIRMS Functional Analysis) were produced. This analysis effort culminated in the production of the AFIRMS FAR (Draft) in October 1979.

b. Over four hundred Air Force personnel have provided expertise, advice, guidance, and critical reviews of working documents. These personnel represent all levels of command and various functional areas within the Tactical Air Command, Strategic Air Command, Military Airlift Command, and Air Force Logistics Command. The current and learning prototype phases are concentrating on the Tactical Air Command. Contributors to the FAR include functional area AFIRMS users at HQ USAF, HQ TAC, HQ 9AF, 4TFW, and 354TFW.

c. The analysis effort utilized the Structured Analysis Design Technique (SADT™) of SofTech, Inc. An extensive library of SADT diagrams, the product of the analysis and study effort, as well as interview notes and supporting data have been provided as contract deliverable items.

d. The FAR concludes that, "An improved method of readiness measurement is required to provide assessment information of the quality and utility desired by Air Force decision makers." It suggests that a new concept of a "tasking-based" capability metric, expressed in standard units, is required. The FAR recommends a twenty-four month Learning Prototype Phase and the continued involvement of functional users to choose among the feasible options available for an operational system.

4. Workload

a. This DAR deals with workload as more than just "expenditure of computer resources" (as implied by AFR 300-12) since current readines's measurement consists of a complex combination of manual operations and ADPE processing, at all levels of the Air Force. There are approximately 150 existing systems that address data needed to produce a readiness measurement capability, and they require considerable human and computer resources. Systems such as FORSTAT, UCMS, the new UNITREP, and FOCAS, are typical of systems which currently aggregate data and/or display readiness measurement information. The FAR concludes that the current workload is large and highly decentralized.

b. It is not possible at this time to accurately project the workload impact of AFIRMS. For example, AFIRMS may require the collection of additional data, but state-of-the-art data collection devices and "product driven" requirements may make it possible to reduce the total number of data collection transactions from the current level. Since only data necessary to produce AFIRMS' products will be collected, workload may be reduced. The Learning Prototype Phase will provide reliable data for projecting the workload of the operational AFIRMS.

5. Proposed ADPS

a. Current readiness measurement methods are based on C-ratings. Although this system stimulates a regular and disciplined review of unit resource status, Section 4 of the FAR (Assessment of Readiness Measurement Concepts) identifies the following deficiencies:

(1) Current systems such as FORSTAT, UCMS, and UNITREP measure available resources versus authorized resources. Although this is an improvement over simple resource counts, the increasing complexity of weapon systems, variety of wartime scenarios, and decreasing response time have strained the utility of this approach. Other than data input and correction, the products of these systems cannot be accessed from the wing level.

(2) The FAR shows that numerous and often inconsistent connotations and notations of readiness exist in the Department of Defense, including the Air Force. Each current method used to compute

readiness is unable by itself to fully evaluate capability. Each is designed for a specific analysis of some subset of readiness and cannot be used for routine day-to-day management of resources or crisis response.

(3) The specific combat capability of a weapon system is not adequately revealed by the resource areas currently reported. This is because the current resource areas reported, as well as graded C1 to C4 and percent fill, do not necessarily indicate or take into consideration the specific mission or tasks required to respond to a specific on-going crisis. Hence, the number of sorties available for a specific mission cannot be determined. Also, the percent fill expression obscures details that a commander must know before he commits a unit to perform a task. The determination of capability under these circumstances depends on a substantial degree of subjectivity.

(4) Current readiness measurement can not measure the impacts of budget and resource allocation decisions on Air Force readiness. It would be difficult, if not impossible, to correlate trends in C-ratings or percent fill to changes in funding levels. Since there is no satisfactory capability metric, such as the sortie, it is difficult to determine what one can do with available resources.

(5) Current readiness measurements are not timely. Wing or squadron commanders and management staff require detailed information about the immediate situation. However, existing data bases do not reflect an up-to-date status; indeed, readiness data may be as much as three days old. Most crisis decisions require the availability of detailed, near "realtime" readiness data.

b. The FAR reveals the need for a set of methods, procedures, and supporting facilities that eliminate or reduce existing limitations and provide needed capabilities. A method of deriving all levels of tasking in terms of a standard metric such as sortie is required so that $\frac{\text{available capability}}{\text{specified capability}}$ becomes

the core of readiness measurement. To achieve this kind of readiness measurement, the following procedures, methods, or processes must be improved or provided:

(1) Improvement in the use of data base technology and source data collection methods is required. Methods should be timely, accurate, and present minimum inconvenience to the person using or collecting the data.

(2) A capability should exist to transform collected data into a coherent picture of Air Force readiness at the level requesting the information. The transformation should be tasking-based and should use objective metrics such as sortie production.

(3) Methods should be defined to represent results to the user in forms meaningful for his purposes.

c. The SADT models used in the FAR to analyze readiness measurement information requirements show simularities in tasks, information requirements, and required properties between command levels and across functional areas. This suggests that the set of solutions necessary to satisfy the requirements is smaller than might be implied by the complexity of the models. Many solutions will be valid at all command levels; a few, however, will be command unique. This assumption, combined with requirements for fidelity and coherence of readiness measurement, can be validated by a Learning Prototype Phase at the Tactical Fighter Wing and at least one higher (TAC or 9AF) level.

d. The Learning Prototype Phase will reduce the uncertainties of an operational AFIRMS by determining the feasibility, utility, and cost of satisfying the FAR. The objective is to learn the information necessary to proceed with development of an affordable operational capability. The operational AFIRMS will be the set of process solutions selected by the Air Force after examination of the results. The Learning Prototype Phase is discussed in Attachment 2 (AFIRMS Feasibility Study).

e. The expected duration of the proposed Learning Prototype Phase is twenty-four months. The products of this phase will include a detailed functional and system description of the operational AFIRMS.

The projected duration of the Operational Phase will also be a product of the Learning Prototype Phase. Operational Phase duration will depend on the system architecture selected. In fact, considering the highly flexible system architectures of microcomputer technology, duration may not be an identifiable parameter for the Operational Phase.

f. Hardware used and software generated during the Learning Prototype Phase will not necessarily become part of the Operational Phase. Instead, alternatives gathered and data derived from the Learning Prototype Phase will be used to select state-of-the-art hardware and generate appropriate software for the Operational Phase. This is because the purpose of the Learning Prototype Phase (development and evaluation of alternative solutions) differs considerably from the purpose of the Operational Phase (cost effective, reliable operation). It might, however, be useful to retain the prototype hardware and software during the design and implementation of the operational software. If that is done, the Air Force will be able to continue development of readiness measurement solutions in parallel with implementation. Eventually, the prototype hardware will serve no useful purpose for the AFIRMS program and should be phased out completely. If desirable, software developed during the Learning Prototype Phase may be used in the Operational Phase since it will be written in a portable High Order Language. Even where software is not directly portable, the procedural knowledge learned from the prototype may be useful in the operational system.

g. An operational AFIRMS will require telecommunications support. A precise specification of support requirements will be a product of the Learning Prototype Phase. An ADP and Telecomunications Requirements Checklist for the Learning Prototype Phase is included with this DAR (see attachment 3). It will be updated for the Operational Phase and submitted with the final DAR.

6. ADS Development

a. The only feasible alternative for support during the Learning Prototype Phase is through the use of contractor personnel. This alternative provides for meeting prototype objectives without the necessity of forming a unique (and temporary) organization within the Air Force. The short length of time allocated for the Learning Prototype Phase (twenty-four months) is not sufficient to staff-up for in-house manning and to complete objectives.

b. The Learning Prototype Phase will produce a set of implementation alternatives for the Operational Phase. Since potential technical risk/benefits will be well defined at that time, alternatives for that phase will probably include in-house manning and various degrees of contractor involvement.

7. Equipment

a. Detailed equipment requirements for the Learning Prototype Phase will be determined during the learning prototype process discussed in the Feasibility Study. Equipment requirements will be selected only after it is clear that they satisfy compelling process requirements. Likely alternatives will be selected using objective decision analysis techniques. In order to reduce technology risks, hardware and systems software will be off-the-shelf from reliable vendors.

b. Some scope of the required equipment is provided by the FAR and the concept of the Learning Prototype Phase discussed in the Feasibility Study:

(1) There is no requirement for the processing power of a large mainframe-computer. But, to develop heavily-instrumented applications software in a High Order Language suggests that a micro-computer may be too small. Thus, a minicomputer seems the most appropriate alternative.

(2) One mini-computer system should be located at the prototype wing(s). A second, will be located at HQ USAF. 9600 baud communications line will connect the systems.

(3) As many as 30 data entry devices of various types may be required, with the majority of these associated with the wing level site.

(4) At least two intelligent color graphics terminals with auxiliary input devices (touch panels, etc.) may be required at each site. Also, each site may require color graphics hard copy devices for the production of color vue-graphs and other "products".

(5) Several additional "dumb" terminals and at least one line printer will be required at each site to expedite software development.

(6) Mass storage requirements for each site will include two removable diskpack drives and one tape drive for backup.

(7) Systems software for each site would include at least a sophisticated operating system, associated development tools, and a sophisticated data base management system.

c. Alternative equipment requirements for the Operational Phase will be a product of the Learning Prototype Phase and will be detailed in the final DAR.

8. Costs and Benefits

a. The cost of the Learning Prototype Phase will be between $4.5M and $5.5M with the likely figure being $5M (see attachment 4, Economic Analysis of the Learning Prototype Phase). This includes personnel costs ($4M) and equipment costs ($1M). The benefits of this phase of the AFIRMS program include laying a firm requirements and systems foundation, as well as defining cost and feasibility factors for developing the operational system prior to development of an Operational Phase which may cost on the order of $90M (see attachment 1, Economic Analysis).

b. The products of the AFIRMS Learning Prototype Phase include:

(1) A final DAR with alternative requirements for Operational Phase.

(2) A final Data Project Plan for the Operational Phase.

(3) A detailed Functional Description for the Operational Phase.

Together these documents will provide a complete set of answers to questions the Learning Prototype Phase must answer. The primary objective is to reduce uncertainties in developing the operational system to a manageable level. Also, the utility of a tasking-based capability metric will be addressed.

9. Impact Statement

The mission impact of AFIRMS development is inferred from the critical requirements and analysis of current methods contained in the FAR. A major goal of AFIRMS is to provide benefits to all levels of the Air Force, from HQ USAF to the unit, particularly at the wing. Mission-related benefits derived from the proposed ADPS are of such significance to the readiness posture of the Air Force that failure to provide for AFIRMS development will directly impact the Air Force ability to maintain and improve its readiness to meet its assigned tasking.

10. Funds

a. Actions are currently underway to establish a Program Element for the AFIRMS and to introduce this program into the POM cycle. Funds are not required for the operational system until FY84.

b. Since the concept of a learning prototype phase was developed in September, 1979, no funds have been provided or identified. Therefore AF/XO will request assistance from AF/ACD to identify $5.5M needed for the learning prototype. The $5.5M requirement is distributed over FY80,81,82. Specific quarterly requirements and and a request for assistance will be addressed as a separate action.

11. Additional Resource Requirements/Availability

None.

12. Major System Development Effort

a. The complete operational system is currently envisioned as a four-level hierarchically distributed system of mini- and/or micro-computers. Each level would consist of four major elements: source data collection, data base management, computation and simulation,

and product generation. The systems would be essentially the same at all levels (HQ USAF, HQ MAJCOM, NAF, BASE). The major difference between levels would be the need for more aggregated products at higher levels, and more source data entry devices at the base level. Also, the wing level readiness measurement capability would have to be deployable.

b. The delineation of operational subsystems and the way in which they are integrated into the overall operational system, will be a product of the Learning Prototype Phase.

13. Other Potential Applications There may be favorable side effects from the efficient collection of data, but no other specific applications are envisioned.

14. Requirements Validation

The Functional Area Requirement has been validated and the Final document was published 14 March 1980.

15. Other Comments

a. See attachment 4 for the Economic Analysis of the Learning Prototype Phase and attachment 1 for the Economic Analysis of the Operational Phase.

b. See attachment 2 for the Feasibility Study which includes a description of the Learning Prototype Phase.

c. Attachment 3 is the ADP and Telecommunications Requirements checklist for the Learning Prototype Phase. A checklist for the Operational Phase will be included in the final DAR.

d. Section 7 (References) of the FAR contains a complete list of references for AFIRMS to date.

16. Joint Signature Block

Functional Area OPR

ADP Program Manager

ATTACHMENT 1

DRAFT OPERATIONAL AFIRMS ECONOMIC ANALYSIS

1. Problem/Opportunity Statement

a. This draft economic analysis provides a best preliminary estimate of development, and operational costs of the operational Air Force Integrated Readiness Measurement System (AFIRMS).

b. The AFIRMS Feasibility Study (attachment 2) explains that a comprehensive economic analysis of the operational AFIRMS must wait for the evaluation of feasible alternatives during the AFIRMS Learning Prototype Phase. The purpose of this analysis is to provide a comparison to the results of the Prototype AFIRMS Economic Analysis (Attachment 4).

2. Relevant Environment

a. User readiness measurement information requirements are identified in Section 3., Readiness Measurement Information Requirements, of the AFIRMS Functional Area Requirement (FAR). In that document, the requirements are presented in context through the use of Structured Analysis Design Technique (SADT™) models and are subsequently summarized in tabular form.

b. The requirements summarized in the tables include three levels of command; Air Staff, HQ TAC, and TFW. Additionally, they encompass two operational modes: day-to-day management and crisis management.

c. A summary of Air Force day-to-day management requirements is reproduced in annex 1 of this Economic Analysis as it was presented in the FAR. Similarly, a summary of Air Force crisis management is included in annex 2. These summaries show the functions supported by readiness measurement information. Also, required information content, timing, and format properties are summarized.

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3. Postulation of Objectives

a. The overall objective of the AFIRMS program is to support Air Force decision makers and their staffs by providing a complete, timely, and accurate measurement of readiness. Specific objectives will be determined when supporting information is supplied by the AFIRMS Learning Prototype Phase. requirements listed in annexes 1 and 2. They are:

(1) The new concept of a "tasking-based" capability metric, expressed in standard units, must be adopted.

(2) The automation products of AFIRMS will be produced by processing data collected at various Air Force sites. AFIRMS' products, not necessarily all data, must be accessible at each command level of the Air Force.

(3) There must be an effective use of proven stateof-the-art data base technology and source data collection methods. AFIRMS should provide timely and accurate information, and should present minimum inconvenience to persons using or collecting the data.

(4) There must be a capability to transform source data into a coherent picture of readiness. The transformation function should be tasking-based and should produce objective metrics.

(5) Methods must be defined to present results to the user in forms meaningful for his purposes.

4. Assumptions and Constraints

a. There will be a twenty-four month Learning Prototype Phase that provides a detailed set of objectives and several alternatives for an operational AFIRMS.

b. ADPS proven state-of-the-art during the development of operational system will be functionally similar to what it is now. For example, microcomputers and data capture devices will exist and probably be more powerful and sophisticated than now.

c. The results of the Learning Prototype Phase will refine and possibly expand the requirements currently known (i.e., there will be no big surprises).

d. The only benefits costed are automated ones.

e. There will be sufficient knowledge to install AFIRMS throughout the Air Force (not just TAF). Studies of other major commands and special Model Design Series (MDS) will have to be made. This implies the installation of about 120 systems. About 20 sites will contain colocated systems. this analysis, there will be no assumptions about the variance of configurations to satisfy different requirements at different levels of the Air Force.

5. Postulation of Alternatives

It would be far too speculative to generate alternatives to the operational system presented in this DAR. The following cost estimates are only a best preliminary estimate based on the assumptions and constraints listed above.

6. Cost Estimates

a. Only one operational AFIRMS best preliminary cost estimate is developed for this DAR. It will serve as a baseline for comparisons with the cost of the prototype effort. Several well-defined alternatives will be a product of the Learning Prototype Phase. These alternatives will be presented and compared in the final DAR.

b. The best preliminary cost estimate for the six year phased implementation of Operational AFIRMS is approximately $90M. This period includes the development, installation, and partial operation of the operational system. The best preliminary cost estimate for maintaining a fully operational AFIRMS is approximately $10M per year.

c. All figures are based on substantiated 1979 figures or on accepted "rules-of-thumb". A hierarchical itemization of the assumed components is included in annex 3. Since the real configuration

of an operational AFIRMS is not known, only generic items are considered. Justifications for the costs shown in annex 3 follow:

(1) Software cost is an educated guess. It assumes the existance of a top-level design based on an alternative selected from the prototype phase. A baseline system at a cost of about $2M would be developed with this design. Major variants of that baseline require customized software for each major command (HQ USAF, TAC, PACAF, USAFE, MAC, and SAC). Minor variants require customized software for each base (to support local hardware configurations, etc.) and for the major MDS' of the Air Force. The base variation should take about one man-year ($60K) and the MDS variation about one-third man-year.

(2) Man-year data includes the cost of an AFIRMS agent whose task is to provide the expertise necessary to insure the full utilization of AFIRMS at each site. This will require one full-time Air Force person with no back-up at about 100 sites. (This is based on the assumption of 120 systems with about 40 of them colocated.)

(3) Equipment costs are based on 1980 of the shelf costs, but no particular vendor should be inferred. Also, the number of devices is based on "average" configuration. In reality, the number of devices will vary somewhat between sites (e.g., wings require more data capture devices, and higher levels require more presentation devices).

(4) Site preparation is assumed to be about 10% of the ADPE cost.

(5) The military pay of $11036 is the 1979 POM figure for the AFIRMS agent man-year.

(6) Telecommunications costs are not included since they are highly speculative. Communication tariffs three years from now may be much different. Also, the tariffs are dependent on configuration, which is unknown.

(7) Maintenance of the system includes supplies, training, spares, etc. It is assumed to be about $24K per year per site.

(8) The maintenance of purchased ADPE is assumed to be 1% of the purchase cost per month per site. This is about $48K per year.

d. A phased implementation is recommended. Annex 4 presents a probable set of figures. The AFIRMS Operational Phase would not begin until 1984, after completion of the Learning Prototype Phase. MAJCOMs should be phased in one at a time so that software development costs of the major and minor variants can be spread as uniformly as possible over the development period.

e. Annexes 5 through 7 contain draft copies of the Economic Analysis forms prescribed by AFR 300-12. A detailed, firmly based set will be included in the final DAR. Inflation is ignored in the figures shown.

7. Benefits

a. The major benefit of AFIRMS will be the availability of complete, timely, accurate readiness measurement information at all levels of the Air Force.

b. A tasking-based capability metric, expressed in standard units, will simplify and clarify expressions of readiness throughout all command levels of the Air Force.

c. There will be a capability to transform collected data into a coherent picture of Air Force readiness.

d. Readiness information will be presented to the user in forms meaningful to his purpose. Appropriate readiness information will be available to all users from unit to Air Staff.

8. Comparison of Alternatives

Comparisons should not be made to this "best possible cost estimate". The AFIRMS Learning Prototype Phase will produce a set of feasible alternatives for consideration in the final DAR.

9. Sensitivity Analysis

a. Since costs will vary before the projected starting date of 1984, it is not possible to develop meaningful pessimistic, optimistic and most likely estimates at this time. An identification of sensitive factors and a description of their potential influence on the selection of alternatives and achievement of objectives will be included in the final DAR.

b. It is possible, of course, to speculate about the sensitivity of the best preliminary estimate. The software baseline cost is, as noted, an educated guess. If this figure is off by $1M, the total variation for all software development is about $2M. An inflation rate of 7% would compound to raise military pay to about $15K/man by 1984. This would raise overall operational costs by about $.5M. On the other hand, ADPE costs might be expected to drop as much as 10% by 1984. This deflation would impact capital costs and ADPE maintenance, resulting in an uncertainty of $7M. Site maintanence is the most uncertain cost advances in software and hardware reliability might ease user maintenance in the near future. A variation of 15% leaves an uncertainty of $1M.

c. The total uncertainty in the six-year phased implementation figure is about $10M ($2M + .5M + 7M + 1M). Thus, the best preliminary cost estimate ranges from $80M to $100M.

10. Contingency Analysis

Once alternatives have been determined the potential impact of major changes in the real world will be considered. This will include such contingencies as AFIRMS budget changes, the deployment of wings, etc.

11. Summary/Recommendation

The Air Force Readiness Initiatives Division (AF/XOOIM) recommends that this best preliminary estimate of an operational AFIRMS be approved as described herein.

7 ANNEXES

1. Summarized Day-to-Day Management Readiness Information Requirements
2. Summarized Crisis Management Readiness Information Requirements
3. Itemization of Operational AFIRMS Best Preliminary Cost Estimate
4. Suggested AFIRMS Phased Implementation Schedule
5. Economic Analysis Summary of Alternative Number One (Form 2054)
6. Economic Analysis ADPMIS Best Preliminary Estimate of AFIRMS Operation (Form 20550)
7. Economic Analysis of ADPMIS Best Preliminary Estimate of AFIRMS Development (Form 2055D) resource allocation

ANNEX 1
SUMMARIZED DAY-TO-DAY MANAGEMENT READINESS INFORMATION REQUIREMENTS
(from AFIRMS FAR)

FUNCTIONS SUPPORTED		
PLAN PROVIDE MAINTAIN TRAIN		
CONTENT	TIMING	FORMAT
• Must reflect readiness impact of trends in condition of resources • Must be aggregated to a level which is useful for making force structure, budgeting, and resource allocation decisions • Must identify and quantify system wide deficiencies • Must state resource requirements to meet hypothetical tasking • Must assist both line management (wing level decision making) and high level management, (Air Staff decision making) • Must represent a level of detail appropriate to the decision being made • Must answer questions directly	• Must be available for performance of day-to-day activities • Must be available as desired	• Must be presented in formats tailored to varied needs of users

ANNEX 2
SUMMARIZED CRISIS (CONTINGENCY) MANAGEMENT READINESS INFORMATION REQUIREMENTS
(from AFIRMS FAR)

FUNCTION SUPPORTED		
ANALYZE REQUIREMENTS	IDENTIFY AND SELECT UNIT AND RESOURCES	MONITOR AND MANAGE
CONTENT	**TIMING**	**FORMAT**
• Must be presented at a level of detail appropriate to the decision being made • Must relate readiness (capability) to specific tasking, i.e., must be scenario sensitive • Must identify and quantify shortfalls (limiting factors) • Must specify assumption on which assessments are made	• Must be available for formulating options and preparing for decisions • Near real-time currency of unit capability information	• Must provide a quick grasp of situation • Must represent a coordianted picture of Air Force or aggregation required • Must be unambiguous to any user

ANNEX 3

ITEMIZATION OF OPERATIONAL AFIRMS' BEST PRELIMINARY COST ESTIMATE

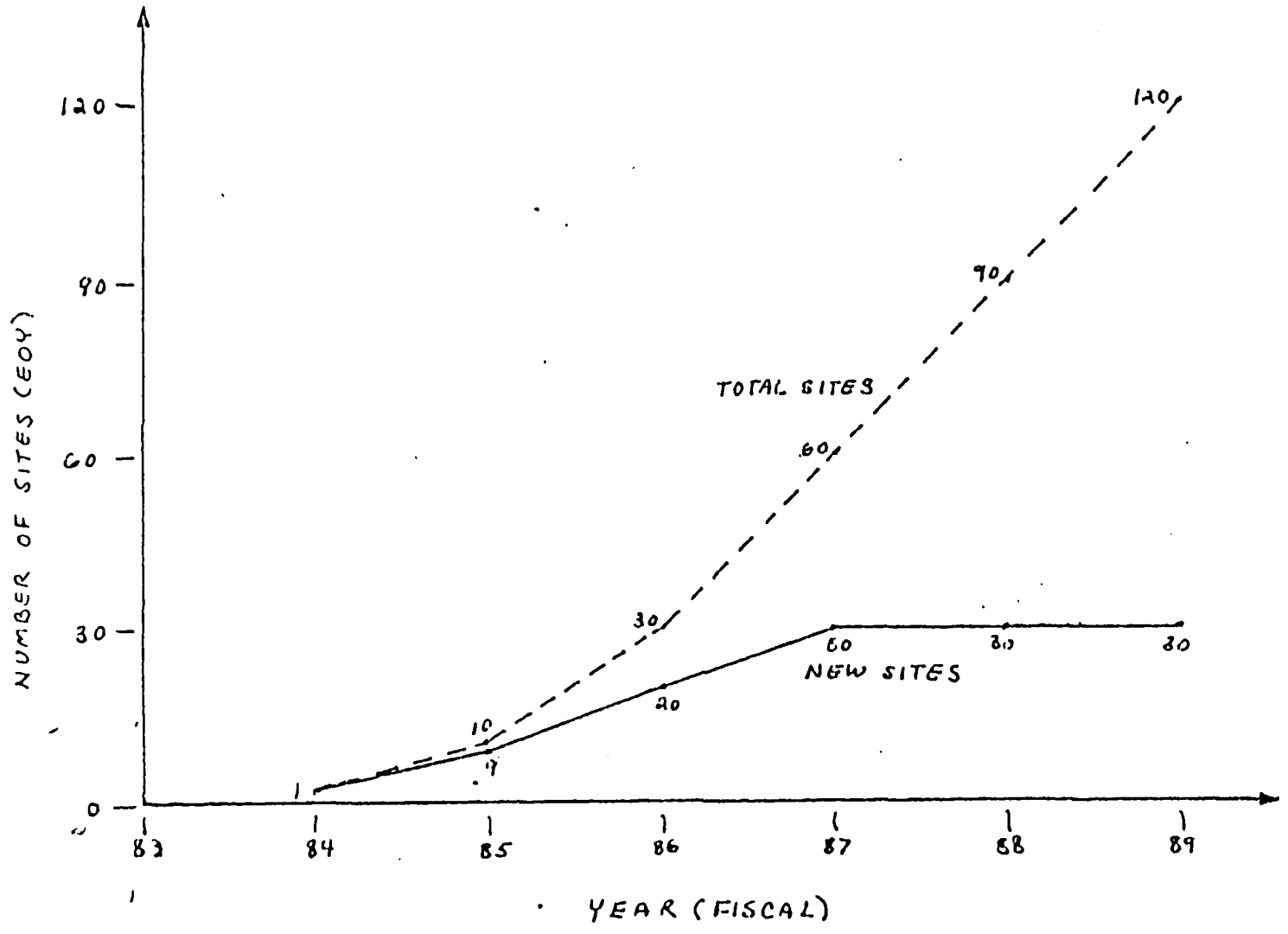
DEVELOPMENT ($63960K total)

Contractual Service Costs	11400K			
Software		11400K		
Baseline @ 2000K			2000K	
Major Variants @200K x 6			1200K	
Minor Variants			8200K	
MDS @ 20K x 50				1000K
BASE @ 60K x 120				7200K
Capital Costs	52560K			
Equipment Purchases (EDPE for 120 sites)		47760K		
EDPE for 1 site			398K	
Micro Processors @ 6K x 2				12K
Mass Storage Devices @ 5K x 2				10K
Data Capture Devices @ 5K x 30				150K
Presentation Devices				204K
Display @ 20K x 10				200K
Hardcopy @ 4K x 1				4K
Hardcopy @ 4K x 1				4K
Communications				22K
External @ 2K x 1				2K
Internal @ .5K x 40				20K
Site Preparation @ 40K x 120		4800K		

OPERATIONAL ($9860K/year full system) Man-year Data

Military EOY @ 1/cosite x 100	100 men
In-House Operating Costs (1 year-site)	4100K/year-site
Military Pay @ 11K x 100	1100K
Maintenance @ 25K x 120	3000K/year
Maintenance of ADPE @ 48K/year x 120	5760K/year

ANNEX 4
SUGGESTED AFIRMS PHASED IMPLEMENTATION SHEDULE



ANNEX 5
AFFIRMS BEST PRELIMINARY COST ESTIMATE

ECONOMIC ANALYSIS (Summary of Alternative Number One) (All costs in thousands of dollars)	ALTERNATIVE TITLE: AFIRMS BEST PRELIMINARY COST ESTIMATE									REV. NO.	DATE OF SUBMISSION		
COST ELEMENTS	1 / 84	2 / 85	3 / 86	4 / 87	5 / 88	6 / 89	7	8	9	10	11	12	TOTAL
I. NET MIS COST:													
A. DEVELOPMENT (Resource use identifier "D" AF Form 1052)	2438	6942	10960	16340	15140	14140							63960
B. OPERATIONAL (Resource use identifier "O" AF Form 1052)	73	796	2432	4908	7384	9860							25453
C. PHASE-DOWN (Resource use identifier "P" AF Form 1052) NONE													
D. TOTAL	2511	6738	13392	20248	22524	24000							89413
II. OTHER (Non-MIS) NONE													
A. DEVELOPMENT (Resource use identifier "D" AF Form 1052)													
B. OPERATIONAL (Resource use identifier "O" AF Form 1052)													
C. PHASE-DOWN (Resource use identifier "P" AF Form 1052)													
D. TOTAL													
III. SUMMARY OF COST (Totals of I and II) SAME													
A. DEVELOPMENT													
B. OPERATIONAL													
C. PHASE-DOWN													
D. TOTAL													
IV. ANTICIPATED OFFSETTING COST REDUCTION SAVINGS (AF Form 1037) NONE													
A. DISCONTINUANCE OF CURRENT SYSTEM (AF Form 1037)													
B. AUTOMATION AVOIDED (AF Form 1037)													
C. NON-MIS COST REDUCTIONS (AF Form 1037)													
D. TOTAL													
V. NET ANNUAL COST (Savings) (III D Less IV D) (Carry forward to AF Form 1052 by Project Year)	2511	6738	13392	20248	22524	24000							89413

AF FORM JAN 71 2054 REPLACES AF FORM 189, OCT 71, WHICH IS OBSOLETE

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ANNEX 6
AFIRMS BEST PRELIMINARY OPERATION COST ESTIMATE

ECONOMIC ANALYSIS (ADP MIS Costs) (All costs in thousands of dollars)

ALTERNATIVE TITLE: AFIRMS BEST PRELIMINARY OPERATION COST ESTIMATE

ALT. NO: 99 | REV. NO: 00 | DATE OF SUBMISSION:

RESOURCE USE IDENTIFIER (0 / 1)	CROSS REFERENCE: CAT	CROSS REFERENCE: COL. NUMS	CROSS REFERENCE: LINE NUMBER IN MILESTONE PROGRESS REPORT AF FORM 3000	CONTROL FIELDS: PEC (11-51)	CONTROL FIELDS: SPP (52)	CONTROL FIELDS: MDI POI (54)	CONTROL FIELDS: BASE TYPE (55)	CAT	SIZE	PROJECT YEARS/FISCAL YEARS: 1 / 84 (57-62)	2 / 85 (63-68)	3 / 86 (69-74)	4 / 87 (75-80)	5 / 88 (81-86)	6 / 89 (87-92)	7 (93-98)	8 (99-104)	CAT	SIZE	9 (57-62)	10 (63-68)	11 (69-74)	12 (75-80)	TOTAL
COST/BENEFIT ELEMENTS																								
A. MANYEAR DATA:																								
1. CIVILIAN EOY STRENGTH	N	20-24	A1				A																	
2. MILITARY EOY STRENGTH	N	20-24	A2				C			0	6	22	48	74	100									250
3. TOTAL			A3				E			0	6	22	48	74	100									250
B. CAPITAL COSTS																								
1. EQUIPMENT PURCHASES																								
a. EDPE	P	30-36	B1a				E																	
b. PCAM	P	37-41	B1b				F																	
c. OTHER	P	42-46	B1c				G																	
2. SITE PREPARATION	P	47-51	B2				H																	
3. TOTAL CAPITAL COSTS			B3				I																	
C. IN-HOUSE OPERATING COSTS																								
1. PERSONNEL																								
a. CIV SALARIES & OVERTIME		N/A	C1a				K																	
b. MILITARY PAY & ALLOWANCES		N/A	C1b				O			0	66	242	528	814	1100									2750
2. LEASED EDPE RENTAL & MNT																								
a. EDPE	O	30-36	C2a				J																	
b. PCAM	O	37-41	C2b				K																	
3. MAG TAPES/DISK PACKS & SUP.	O	31-36 42-46	C3				L																	
4. TELECOMMUNICATIONS	O	47-51	C4				M																	
5. MAINTENANCE PARTS & OTHER	O	30-36 42-46	C5				N			25	250	750	1500	2250	3000									7275
6. TOTAL IN-HOUSE COSTS			C6							25	316	992	2028	3064	4100									10525
D. CONTRACTUAL SERVICE COSTS																								
1. PERSONNEL (Spc Anal/Prog & KP/Var Svcs)	O	30-36	D1				O																	
2. EDPE TIME & RELATED SVCS	O	37-41	D2				P																	
3. MAINT OF PURCHASED EDPE	O	42-46	D3				Q			48	480	1440	2880	4320	5760									14928
4. OTHER*	O	47-51	D4				R																	
5. TOTAL CONTRACT SVC COSTS			D5							48	480	1440	2880	4320	5760									14928
E. REIMBURSABLE SERVICE COSTS	P	52-56	E				S																	
F. GROSS MIS COSTS (C6 & D5 & E)			F							73	796	2432	4908	7384	9860									25453
G. LESS REIMBURSABLE SER INC	P	52-56	G				T																	
H. NET MIS COSTS (F − G)			H							73	796	2432	4908	7384	9860									25453

AF FORM JAN 77 2055 REPLACES AF FORM 190, OCT 71, WHICH IS OBSOLETE.

* U.S. GOVERNMENT PRINTING OFFICE : 1977 O-776-015/7110

ANNEX 7
AFIRMS BEST PRELIMINARY DEVELOPMENT COST ESTIMATE

ECONOMIC ANALYSIS (ADP MIS Costs) (All costs in thousands of dollars)

ALTERNATIVE TITLE: AFIRMS BEST PRELIMINARY DEVELOPMENT COST ESTIMATE

ALT. NO. | REV. NO. | DATE OF SUBMISSION

RESOURCE USE IDENTIFIER (D)	CROSS REFERENCE: OD-COMP (AR)-996 COL-UMNS	CROSS REFERENCE: LINE NUMBER IN MILESTONE PROGRESS REPORT AF FORM 3065	CONTROL FIELDS: PEC	APD	MDS PDI	CARD TYPE	PROJECT YEARS/FISCAL YEARS 1 (84)	2 (85)	3 (86)	4 (87)	5 (88)	6 (89)	7	8	9	10	11	12	TOTAL
COST/BENEFIT ELEMENTS			10-31	32	34	35	87-88	89-90	91-92	93-94	95-96	97-98	99-00	01-02	87-88	89-90	91-92	93-94	
A. MANYEAR DATA:																			
1. CIVILIAN EOY STRENGTH	80-82	R1				A													
2. MILITARY EOY STRENGTH	83-85	R2				C													
3. TOTAL		R3																	
B. CAPITAL COSTS																			
1. EQUIPMENT PURCHASES																			
a. ADPE	20-29	C1a				E	398	3582	7960	11940	11940	11940							47760
b. PCAM	30-31	C1b				F													
c. OTHER	32-36	C1c				G													
2. SITE PREPARATION	37-41	C2				H	40	360	800	1200	1200	1200							4800
3. TOTAL CAPITAL COSTS		C3					438	3942	8760	13140	13140	13140							52560
C. IN-HOUSE OPERATING COSTS																			
1. PERSONNEL																			
a. CIV SALARIES & OVERTIME	N/A	D1a				B													
b. MILITARY PAY & ALLOWANCES	N/A	D1b				D													
2. LEASED ADPE RENTAL & MNT																			
a. ADPE	20-29	D2a				J													
b. PCAM	30-31	D2b				K													
3. MAG TAPES/DISK PACKS & SUP.	81-82 89-92	D3				L													
4. TELECOMMUNICATIONS	83-88	D4				M													
5. MAINTENANCE PARTS & OTHER	88-88 93-96	D5				N													
6. TOTAL IN-HOUSE COSTS		D6																	
D. CONTRACTUAL SERVICE COSTS																			
1. PERSONNEL (Sys Anal/Prog & KP/Var Svcs)	90-94	E1				O	2000	2000	2200	2200	2000	1000							11400
2. ADPE TIME & RELATED SVCS	82-89	E2				P													
3. MAINT OF PURCHASED ADPE	87-89	E3				Q													
4. OTHER	95-96	E4				R													
5. TOTAL CONTRACT SVC COSTS		E5					2000	2000	2200	2200	2000	1000							11400
E. REIMBURSABLE SERVICE COSTS	42-46	F				S													
F. GROSS MIS COSTS (B) & C6 & D) & F)							2438	5942	10960	15340	15140	14140							63960
G. LESS REIMBURSABLE SER INC	88-88	H				T													
H. NET MIS COSTS (F – G)		I					2438	5942	10960	15340	15140	14140							63960

AF FORM 2055 JAN 77 — REPLACES AF FORM 2055, OCT 71, WHICH IS OBSOLETE.

ATTACHMENT 2

AFIRMS FEASIBILITY STUDY

1. Introduction

a. This DAR attachment describes the feasibility study of functional requirements for the Air Force Integrated Readiness Measurement System (AFIRMS). The requirements were determined by conducting a series of interviews, constructing a set of models, and using those models to analyze Air Force readiness measurement (see paragraph 2). The result of this previous study is the Functional Area Requirement (FAR) whose salient conclusions are summarized in paragraph 3.

b. The functional requirements described in the FAR are "operational" requirements as opposed to "data automation" requirements. Therefore, there is a need to extend the scope of the usual feasibility study as described in attachment 25 of AFR 300-12 to include an AFIRMS Learning Prototype Phase. Such a phase would determine data automation requirements and otherwise generate viable alternatives that must be considered before an Operational Phase can begin. The Operational Phase includes the development and employment of the operational AFIRMS. The Learning Prototype Phase and its products are discussed in paragraph 4.

c. A comparison of the Learning Prototype Phase to other development alternatives is considered in paragraph 5.

2. Determination of Functional Requirements

a. The AFIRMS program was initiated by the Directorate of Operations and Readiness, Headquarters United States Air Force in April 1978. The determination of readiness measurement requirements was the major task of this initial phase, which culminated with the production of the AFIRMS FAR (Draft) in October 1979. The functional requirements were determined by a three-step process consisting of formal interviews of AF personnel, the production of graphical models, and analysis and publication of the results. The graphical models were produced by the Structured Analysis Design Technique (SADT™) of SofTech, Inc. The complexity of the readiness measurement problem required successive applications of the three-step process. Each time important results were obtained that provided insights into functional requirements.

b. The process was initiated by the selection and training of Air Force personnel as SADT authors, readers, and commenters. SofTech and the Air Force authors then interviewed members of the Air Staff to determine readiness measurement requirements. These readiness information users explained that the information is required for crisis management, day-to-day management, and Air Force budget Planning that relates to readiness. It was discovered that an unambiguous definition of readiness was required. Also, it was determined that the potential user community was not limited to Air Staff, and that study of readiness measurement should be continued at all levels of the Air Force. The models, analysis, and summary of findings was produced for AF/XOORM as the Users' View of AFIRMS, Task 2 Report 1031-2-1, 1 November 1978.

c. The second application of the three-step process was limited to MAC, SAC, and TAF with the latter being represented by TAC and USAFE. A major product was the determination of the data required to support AFIRMS and its availability. It became clear that a more detailed study at wing level was required. The role of current systems such as FOCUS and UNITREP were studied using SADT models. The findings were produced for AF/XOORM as the AFIRMS Data Analysis, report 1031-2-2, 15 February 1979.

d. The previous studies resulted in a concentrated study of readiness measurement requirements within TAC. Contributors to this effort included potential functional AFIRMS users at HQ USAF, HQ TAC, HQ 9AF, 4TFW, and 354TFW. The resulting models and the conclusions drawn from them are documented in the AFIRMS FAR prepared for AF/XOORM under contract MDA-903-76-C-0396, as report 1031-2-5, 23 October 1979 (Draft). Copies of the FAR has been circulated among the participating user community for comments and corrections. (Over four hundred Air Force personnel have provided expertise, guidance, and critical reviews of working documents during the functional requirements definition phase of AFIRMS.) The final AFIRMS FAR was published on 14 March 1980. Conclusions drawn from the FAR are discussed in the following paragraph.

3. Conclusions of the FAR

a. The limitations and deficiencies of current readiness measurement concepts and methods are serious and must be remidied. In particular, a new concept of a tasking-based capability metric expressed in standard units, is requried. An attempt at a formal definition of this metric is provided in the FAR.

b. The models reveal similarities in tasks, information requirements, and requried properties across all command and functional levels. The set of process solutions necessary to satisfy the requirements may be smaller than the complexity implied by the models. Indeed, most of the solutions will be valid at all command levels.

c. It is uncertain at this time what the alternative solutions are. A critical decision making point in AFIRMS development has been reached. Thus, a Learning Prototype Phase to determine the alternatives is required. The Learning Prototype Phase is described in the following paragraph.

4. Learning Prototype Phase

a. Although it is clear at this point that the satisfaction of AFIRMS' requirements is feasible, the implementation alternatives and associated costs are not so clear. The Learning Prototype Phase described below will provide the environment necessary to learn about ADPS alternatives that satsify the requirements detailed in the FAR. Typical uses of a prototype are described in attachment 24 of AFR 300-12. The AFIRMS use of the prototype is in the spirit of the "prototype 2" description provided there. The Learning Prototype Phase involves an iterative process with the same high level of user involvement that has characterized the AFIRMS program to date. Figure 1 diagrams the Learning Prototype Phase in context with the requirements study and the other elements of the feasibility study. When the prototype phase is complete, the Air Force can select a feasible alternative for development during the AFIRMS Operational Phase.

b. The major steps to be performed during the Learning Prototype Phase are as follows:

(1) Develop detailed product descriptions. Determine solutions are. A critical decision making point in AFIRMS development has been reached. Thus, a Learning Prototype Phase to determine the alternatives is required. The Learning Prototype Phase is described in the following paragraph. What the users want to see; where, when, and in what form. Methods will be created to graphically display data to users. Initial input to this step is the FAR and draft AFIRMS Functional Description (FD). Descriptions will be evaluated and approved by functional users before proceeding to the next step; otherwise, reiterate this step.

(2) Derive the data requirements and data processes necessary to create the products and deliver them timely, accurately, and coherently. Identify possible sources and states of data. Determine if data exists in collectable form; if not, determine what is required to make it collectable. Determine where it can be collected and whether it can be done in a timely fashion. Examine the feasibility of providing desired products. Consider the circumstances of data collection and feasibility of meeting AFIRMS milestones. This step is performed mainly without the aid of the user.

(3) Survey methods of collecting data, performing processes, and presenting products. Determine if processes exist which can be exploited to provide defined products timely, accurately, and coherently. Examine the feasibility of employing these existing processes. Make a gross estimate of the cost factors involved.

(4) Iterate steps (1) through (3) until satisfied that candidate process solutions have been generated which provide an affordable level of the desired benefits.

(5) Evaluate the candidate process solutions by scripted, instrumented trials. Acquire candidate equipment and systems software to support data collection, data processing, telecommunications, and report generation. Modify or adapt existing equipment and/or systems software to fit the need.

Create new hardware and/or applications software as needed. Draft manual procedures if they are necessary. Draw up scenarios to validate use of the tailored candidates to support the process solutions. First, perform a piecewise, instrumented exercise with Air Force personnel. If necessary, modify or adapt the scenarios, candidates, or process solutions. Finally, perform a real-time, full-scale instrumented exercise with potential Air Force functional users. The evaluation is completed by analyzing the result of the exercise and giving reports as required. Document quantifiable benefits derived from various system capabilities.

(6) Implement any "no cost - no sweat" improvements that are discovered.

(7) Iterate to steps (1) or (5) until the target AFIRMS is defined. The criteria for determining the fully defined state will be included in the Data Project Plan.

(8) Finally, describe the target AFIRMS in the form of target process specifications.

c. Products of the Learning Prototype Phase include alternative methods of implementation, schedules, and costs. There will be sufficient knowledge at this point to complete the Feasibility Study and Economic Analysis required by the DAR. Once an alternative is determined, a Final Data Project Plan and Functional Description may be completed.

d. Hardware used and software generated during the Learning Prototype Phase will not become part of the operational AFIRMS. Instead, alternatives examined and data derived from the Learning Prototype Phase will be used to select state-of-the-art hardware and generate appropriate software for the Operational Phase. This is because the purpose of the Learning Prototype Phase (development and evaluation of alternative solutions) differs considerably from the purpose of an operational AFIRMS (cost effective, reliable operation). It might, however, be useful to retain prototype hardware and software during the design and implementation of the operational software so the development of readiness measurement models can continue in parallel with that effort. Eventually, the prototype hardware will serve no useful purpose for the AFIRMS program and should be phased

out completely. Software developed during the Learning Prototype Phase may be used in the Operational Phase since it will be written in a portable High Order Langauge. Even where software is not directly portable, the procedural knowledge learned from the prototype may be useful in the operational system.

5. Recommendations

a. The AFIRMS use of the prototype, Figure 1, shows the possible decisions for the Draft DAR. The conclusions of the FAR (paragraph 3) clearly indicate that the readiness measurement problem is properly scoped by the known requirements. It is time to proceed to the next step.

b. Also, the FAR reveals that the implementation alternatives are uncertain. The AFIRMS program is not ready to proceed with full scale development.

c. The AFIRMS program will be best served by proceeding to the Learning Prototype Phase discussed in paragraph 4 in order to determine a set of feasible alternatives.

AFIRMS USE OF PROTOTYPE

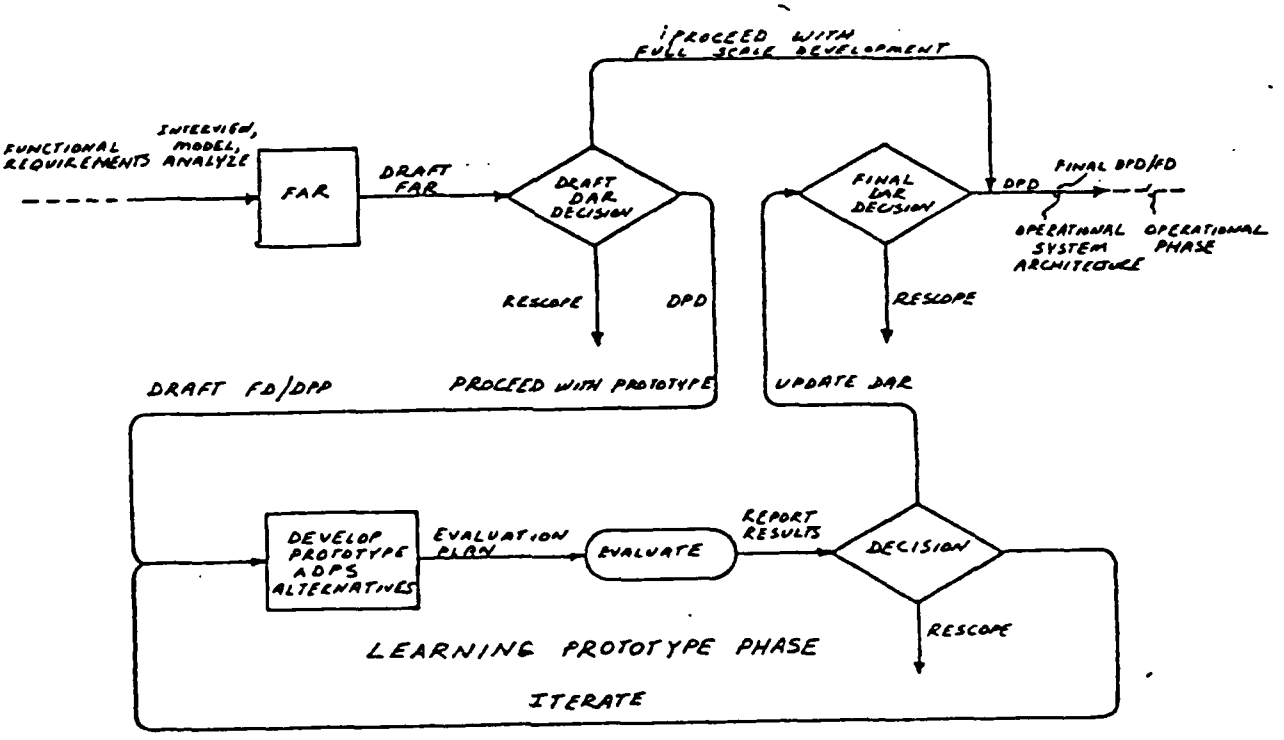

Figure 1

AFIRMS USE OF PROTOTYPE

Figure 1

ATTACHMENT 3

ADP AND TELECOMMUNICATIONS

REQUIREMENTS CHECKLIST

Date of Request December 1979 Subject of Request AFIRMS I. PRIVACY REQUIREMENTS

	YES	NO	NOT APP.
(1) Equipment or services identified by this request will be used to maintain system of records, subject to the Privacy Act of 1974.		X	
(2) A report of new systems has been submitted to the Congress and OMB on _____ as required by OBM Circular No. A-108.			X
(3) The notice requirements of the Privacy Act (5 USC 552a (e) (4) (d), (e) (11), and (f)) have been compiled with.			X

II. FUNDING REQUIREMENTS

(1) Funding in the amount of $ ___ was ___ explicity/___ implicitly included in the agency's FY ___ budget request and the proposed procurement is consistent with OMB budget guidance and policy directives.			X

III. OTHER REQUIREMENTS

(1) A feasibility study requried by FMC 74-5 was completed on ____.			X
(2) A system study has been conducted as required by FPMR 101-32.11 for procurements which contain communications requirements.			X
(3) The requirements of the ADP sharing program in FPMR 101-32.2 have been met.			X

Documentation supporting the above certifications is retained in the agency's files.

SUBMITTING DEPARTMENT/AGENCY CERTIFYING OFFICIAL

Item II(1) is not applicable if procurement is under $50,000.

ATTACHMENT 4

DRAFT AFIRMS LEARNING PROTOTYPE PHASE ECONOMIC ANALYSIS

1. Problem/Opportunity Statement

   a. This economic analysis provides a best preliminary cost estimate of the Learning Prototype Phase for the Air Force Integrated Readiness Measurement System (AFIRMS).

   b. The AFIRMS Feasibility Study (Attachment 2) discusses the need for a Learning Prototpye Phase. Although the AFIRMS' Functional Area Requirement (FAR) provides a set of feasible requirements, implementation alternatives are not so clear. An eight-step, iterative Learning Prototype Phase for determining implementation alternatives is explained in the Feasibility Study.

2. Relevant Environment

   a. Production of the AFIRMS FAR culminated two years of intensive requirements definition by AF/XOORM. Readiness measurement information requirements are identified in the FAR in the form of Structured Analysis and Design Technique (SADT™) models and summarized in tabular form. Over four hundred Air Force presonnel provided expertise, guidance, and critical reviews of working documents during this phase.

   b. The FAR concludes that the limitations and deficiencies of current readiness measurement concepts are serious and must be remedied. However, it is uncertain at this time what the specific alternative solutions are. A critical decision making point in AFIRMS development has been reached. Also, the best preliminary cost estimate of the AFIRMS Operational Phase is large (approximately $90M, see Attachment 1, Draft Operational AFIRMS Economic Analysis). Thus, a Learning Prototype Phase to determine the alternative solutions is both necessary and justifiable.

SADT™ is a trademark of SofTech, Inc.

3. Postulation of Objectives

a. The overall objective of the AFIRMS program is to support Air Force decision makers and their staffs by providing a complete, timely and accurate measurement of readiness.

b. The objective of the Learning Prototype Phase is to generate feasible, affordable alternative solutions that can be used by the Air Force to determine specific objectives for the AFIRMS Operational Phase. Implementers will learn which solutions the user really needs, and will be able to fill in the unknowns in this draft DAR.

c. Since the Learning Prototype Phase is test-bed for the operational AFIRMS, there will be no specific commitment to the hardware and software, utilized during this phase.
This follows the true spirit of OMB Circular A-109 (Major System Acquisitions). That is, the functional specifications and performance requirements are determined first, leaving competitors completely free to propose alternatives for the operational system.

4. Assumptions and Constraints

a. The duration of the Learning Prototype Phase will be twenty-four months. Approximate calendar time will be from June 1980 to June 1982. Following this phase, there will be a period of planning, procurement, and source selection for the Operational Phase.

b. There will be at least two system installations for the Learning Prototype Phase. One, will support HQ USAF and TAC or 9AF and will serve as the development system. The other, will be located at an appropriate wing within the Ninth Air Force (to be determined). Although exact configurations cannot be determined at this time, certain special characteristics can be noted. Due to the multi-role nature of the development system, it will require more main memory and disk storage capacity than the wing system. The wing system will require more local communications to support the various source data entry devices which will be tested.

5. Postulation of Alternatives

No alternative to the Learning Prototype Phase is proposed in this draft DAR.

6. Cost Estimates

a. Only one AFIRMS Learning Prototype Phase best preliminary cost estimate is developed for this DAR. Rather than estimate on a quarterly basis, costs are distributed over the 1980-82 fiscal years assuming a start in June 1980. Thus, there will be four months in the 1980 fiscal year, twelve in 1981, and eight in 1982. Personel costs are spread uniformly over the twenty-four months. Except for a few special items, most of the equipment costs will be in fiscal year 1981. Maintenance costs will remain until the end of the Learning Prototype Phase in June 1982.

b. All costs are based on substantiated 1980 figures or on accepted "rules-of-thumb". A hierarchical itemization of the assumed components is shown in annex 1. Since specific components will be determined during the Learning Prototype Phase, only generic items are considered. Justifications for the costs shown in annex 1 follow:

(1) Site preperation cost is for a typical large mini computer of the type proposed here.

(2) Total equipment rental is assumed for 21 of 24 months, since the first three months will be spent selecting and procuring ADPE.

(3) Specific equipment rentals are shown in annex 1 for a one year period in order to simplify comparisons. Figures are an average of the two sites. If there is a significant difference between sites, both values are shown in parenthesis (development, wing), but the average is used in the computation.

(4) A typical large mini-computer is costed. The development site is more since it requires more memory (about 1MB compared with about 500KB).

(5) Most data capture devices will be at the wing system. A cost of $3K per device is estimated. Actual costs will vary depending on the device.

(6) Four of the six terminals are assumed to be on the development system.

(7) Magnetic tape is mainly for mass storage backup. Two disk subsystems are postulated at each site for redundancy, with the disks at the development system being the larger.

(8) The figures for presentation devices assume two color graphics display units, a line printer, and a color hardcopy device (for color transparancies) on each system.

(9) Communications equipment includes modems and interfaces for external communications and ports for local devices (terminals, displays, data collection, etc.).

(10) The total cost of such items as magnetic tape, diskpacks, and general supplies is uncertain; $10K has been assumed.

(11) Telecommunication costs are estimated for 9600 baud lines from D.C. to Langley AFB (TAC) and from D.C. to Myrtle Beach AFB (354TFW). Unit costs are $370 and $530 per month, respectively. Also, a $108 installation charge is included.

(12) Maintainence is about 1% of purchase price per month.

(13) Personel costs are for a 44 man-year effort at $90K per man-year. This includes program/project management, analysts, system engineers and software engineers.

(14) Travel costs are based on the best preliminary travel plan presented in annex 2. A detailed travel cost estimate is shown in annex 3.

(15) Annex 4 summarizes costs of the Learning Prototype Phase as be spread over three fiscal years, assuming a start in June 1980. Annex 5 details the costs.

7. Benefits

a. The major benefit of the AFIRMS program will be the availability of complete, timely and accurate readiness measurement information to all command levels of the Air Force.

b. A set of feasible, affordable alternative solutions will be available to the Air Force at the conclusion of the Learning Prototype Phase. These will be used to determine specific objectives for the AFIRMS Operational Phase.

8. Comparison of Alternatives

Comparisons should not be made to this "best possible cost estimate". A major goal of the Learning Prototype Phase is to produce just such a set of feasible alternatives for comparison in the final DAR.

9. Sensitivity and Contingency Analysis

a. The AFIRMS Learning Prototype is not a set of equipment. It is the process necessary to determine feasible alternatives for the AFIRMS Operational Phase. Commitments to specific ADPE cannot be made until potential solutions are discovered as part of a best preliminary estimate of what might be needed.

b. Since variations in both personnel and equipment costs can be as great as 10%, the best preliminary estimate for the AFIRMS Learning Prototype Phase is $4.5M to $5.5M, with a most likely cost of $5M.

10. Summary/Recommendation

The Office of Air Force Readiness Measurement (AF/XOORM) recommends that this best preliminary cost estimate of the AFIRMS Learning Prototype Phase be approved as described herein.

5 ANNEXES

1. Itemization of AFIRMS Learning Prototype Phase Best Preliminary Cost Estimate
2. Best Preliminary Travel Plan
3. Best Preliminary Travel Cost Estimate
4. Economic Analysis Summary of Alternative Number One (Form 2054)
5. Economic Analysis of ADPMIS Best Preliminary Estimate of AFIRMS Learning Prototype Phase (Form 2055D)

ANNEX 1

ITEMIZATION OF AFIRMS LEARNING PROTOTYPE PHASE BEST PRELIMINARY COST ESTIMATE

Prototype (twenty-four months)	$4846K				
Capital Costs		12K			
Equipment Purchases (none)					
Site Preperation @ 6K x 2			12K		
In-House Operating Costs for 2 Sites		785K			
Leased ADPE Rental for 21 of 24 months			338K		
EDPE per Year per Site				193K	
Mini-Processor @ 70K (80K, 60K)					70K
Console @ 1K					1K
Data Capture Devices @ 3K x 15 (5, 25)					45K
Terminals @ 1.5K x 3 (4, 2)					4.5K
Mass Storage Devices					30K
Magnetic Tape @ 10K					10K
Magnetic Disk @ 10K x 2					20K
Presentation Devices					36K
Display @ 10K x 2					20K
Hardcopy @ 16K					16K
Communications					6.5K
External @ 1.5K					1.5K
Local @ .25K x 20					5K
Magnetic Tapes/Disk-Packs & Supplies/Site			10K		
Telecommunications/Site			9.5K (11.5K, 7.5K)		
Maintenance/Site			25K		
Contractual Service Costs for Project		4069K			
Personnel			4000K		
Other(Travel)			69K		

ANNEX 2
BEST PRELIMINARY TRAVEL PLAN

TASK	JUN 80 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
① EXERCISE (WING)			Δ 1 week			Δ 1			Δ 1			Δ 1			Δ 1			Δ 1			Δ 2			
② EXERCISE (TAC)							Δ 1			Δ 1			Δ 1			Δ 1					Δ 2			
③ EXERCISE (HQ USAF)											Δ 1						Δ 1				Δ 2			
④ ANALYSIS (WING)		2 anal-wks/month																						
⑤ H/W INSTALL. & CHECKOUT		Δ 1	Δ 1	Δ 1		Δ 1			Δ 1			Δ 3				Δ 2		Δ 1			Δ 3			
⑥ COORDINATION (WING & TAC)		2 man-day/month																						
⑦ LOCAL TRAVEL (CDC)		1 RT/wk																						
⑧ 2 WK ANALYSIS (SAC)															Δ 2									
⑨ 2 WK ANALYSIS (MAC)																		Δ 2						
⑩ PLANNING (INTRA-CORP)		1 man-day/month																						

ANNEX 3
BEST PRELIMINARY TRAVEL COST ESTIMATE

TASK	A TRIPS (ANNEX)	B PEOPLE	C DAYS (ANNEX)	D CAR AIR FARE (RT)	E CAR AIR COST A X B X D	F LOCAL TRAV. [B/4] XC X 35	G SUBSISTANCE B X C X 42.50	TOTAL COST/TASK E + F + G
① EXERCISE (WING)	8	5	40	$200	$8000	$2800	$8500	$19300
② EXERCISE (TAC)	5	4	30	100	2000	1050	5100	8150
③ EXERCISE (HQ USAF)	3	4	20	4.50	54	—	—	54
④ ANALYSIS (WING)	24	2	48	200	9600	1680	4080	15360
⑤ H/W INSTALL. & CHECKOUT	9	1	70 [25]	200	1800	[875]	2975	5650
⑥ COORDINATION (WING & TAC)	24	1	48	300	7200	1680	2040	10920
⑦ LOCAL TRAVEL (DC)	104	1	—	4.50	468	—	—	468
⑧ 2-WK ANALYSIS (SAC)	1	2	10	310	620	350	850	1820
⑨ 2-WK ANALYSIS (MAC)	1	2	10	260	520	350	850	1720
⑩ PLANNING (INTRA-CORP)	24	1	24	150	3600	840	1020	5460
TASK - TOTALS	—	—	—	—	33862	9625	25415	68902

ANNEX 4
LEARNING PROTOTYPE PHASE BEST PRELIMINARY COST ESTIMATE

ECONOMIC ANALYSIS (Summary of Alternative Number) (All costs in thousands of dollars)	ALTERNATIVE TITLE: LEARNING PROTOTYPE PHASE BEST PRELIMINARY COST ESTIMATE	REV. NO.	DATE OF SUBMISSION: JAN 15, 1980										
COST ELEMENTS	1 / 80	2 / 81	3 / 82	4	5	6	7	8	9	10	11	12	TOTAL
I. NET MIS COST:													
A. DEVELOPMENT (Resources not identified "D" AF Form 2053)	753	2492	1601										4846
B. OPERATIONAL (Resources not identified "O" AF Form 2053) NONE													
C. PHASE-DOWN (Resources not identified "P" AF Form 2053) NONE													
D. TOTAL	753	2492	1601										4846
II. OTHER (Non-MIS) NONE													
A. DEVELOPMENT (Resources not identified "D" AF Form 2056)													
B. OPERATIONAL (Resources not identified "O" AF Form 2056)													
C. PHASE-DOWN (Resources not identified "P" AF Form 2056)													
D. TOTAL													
III. SUMMARY OF COST (Totals of I and II) SAME													
A. DEVELOPMENT													
B. OPERATIONAL													
C. PHASE-DOWN													
D. TOTAL													
IV. ANTICIPATED OFFSETTING COST REDUCTION SAVINGS (AF Form 2057) NONE													
A. DISCONTINUANCE OF CURRENT SYSTEM (AF Form 2057)													
B. AUGMENTATION AVOIDED (AF Form 2057)													
C. NON-MIS COST REDUCTIONS (AF Form 2057)													
D. TOTAL													
V. NET ANNUAL COST (Subtract (III D) from (IV D)) (Carry forward to AF Form 2053 by Project Year)	753	2492	1601										4846

AF FORM JAN 80 2054 REPLACES AF FORM 190, OCT 77, WHICH IS OBSOLETE

☆ U.S. GOVERNMENT PRINTING OFFICE: 1977—240-105/5110 01

ANNEX 5
LEARNING PROTOTYPE PHASE BEST PRELIMINARY DEVELOPMENT COST ESTIMATE

ECONOMIC ANALYSIS (ADP MIS Costs) (All costs in thousands of dollars)

ALTERNATIVE TITLE: LEARNING PROTOTYPE PHASE BEST PRELIMINARY DEVELOPMENT COST ESTIMATE

ALT. NO. | REV. NO. | DATE OF SUBMISSION: JAN 15, 1980

RESOURCE USE IDENTIFIER: D

COST/BENEFIT ELEMENTS	CROSS REFERENCE: CAT	COL-UMNS	LINE NUMBER IN MILESTONE PROGRESS REPORT AF FORM 8000	CONTROL FIELDS: PEC	APP	MDI PDI	CARD TYPE	CAT	PROJECT YEARS/FISCAL YEARS: 1 (80)	2 (81)	3 (82)	4	5	6	7	8	CAT	9	10	11	12	TOTAL
A. MANYEAR DATA: NONE																						
1. CIVILIAN EOY STRENGTH	M	20-24	A1				A															
2. MILITARY EOY STRENGTH	M	20-24	A2				C															
3. TOTAL			A3																			
B. CAPITAL COSTS																						
1. EQUIPMENT PURCHASES			B				E															
a. EDPE	P	30-39	C1a				E															
b. PCAM	P	40-49	C1b				F															
c. OTHER	P	50-59	C1c				B															
2. SITE PREPARATION	P	60-61	C2				H		0	12	0											12
3. TOTAL CAPITAL COSTS			C3						0	12	0											12
C. IN-HOUSE OPERATING COSTS																						
1. PERSONNEL			D																			
a. CIV SALARIES & OVERTIME		N/A	D1a				N															
b. MILITARY PAY & ALLOWANCES		N/A	D1b				O															
2. LEASED ADPE RENTAL & MNT																						
a. EDPE	O	30-39	D2a				J		76	400	200											676
b. PCAM	O	40-49	D2b				K															
3. MAG TAPES/DISK PACKS & SUP.	O	31-34 40-42	D3				L		2	10	8											20
4. TELECOMMUNICATIONS	P	61-69	D4				M		1	10	8											19
5. MAINTENANCE PARTS & OTHER	O	35-39 45-49	D5				M		5	30	15											50
6. TOTAL IN-HOUSE COSTS			D6						84	450	231											765
D. CONTRACTUAL SERVICE COSTS																						
1. PERSONNEL (Sys Anal/Prog & KP/Ver Spec)	O	60-69	E1				O		660	2000	1340											4000
2. ADPE TIME & RELATED SVCS	O	62-69	E2				P															
3. MAINT OF PURCHASED ADPE	O	67-69	E3				Q															
4. OTHER (TRAVEL)	O	65-69	E4				R		9	30	30											69
5. TOTAL CONTRACT SVC COSTS			E5						669	2030	1370											4069
E. REIMBURSABLE SERVICE COSTS	P	60-69	F				S															
F. GROSS MIS COSTS (D3 & C4 & D5 & F)			G						753	2492	1601											4846
G. LESS REIMBURSABLE SER INC	P	60-69	H				T															
H. NET MIS COSTS (F − G)			I						753	2492	1601											4846

AF FORM JAN 77 2055 REPLACES AF FORM 206, OCT 71, WHICH IS OBSOLETE.

END

DTIC

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